

What is claimed is:

1. A waveguide to microstrip T-junction comprising:
 - a microstrip transmission line structure having a ground plane separated from a strip conductor by a dielectric layer, said ground plane defining an aperture;
 - 5 a waveguide channel having a conductive periphery being electrically coupled to the ground plane to provide a waveguide short circuit wall located at the end of the waveguide channel;
 - at least one conducting ridge inside the waveguide channel; and
 - an end of the ridge being electrically coupled with the ground plane.
- 10 2. The waveguide to microstrip T-junction recited in claim 1, wherein the longitudinal axis of the waveguide channel is perpendicular to the ground plane.
3. The waveguide to microstrip T-junction recited in claim 1, further comprising a second ridge, wherein a projection of a gap between the ridges on the ground plane, is transverse to the microstrip line.
4. The waveguide to microstrip T-junction recited in claim 1, wherein a long dimension of the aperture is transverse to the microstrip line.
5. The waveguide to microstrip T-junction recited in claim 1, wherein the aperture has an H-shape.
6. The waveguide to microstrip T-junction recited in claim 1, wherein the waveguide channel has a rectangular cross-section.
7. The waveguide to microstrip T-junction recited in claim 1, wherein the waveguide channel has a elliptical/circular cross-section.
8. The waveguide to microstrip T-junction recited in claim 1, wherein the ground plane is bonded to the waveguide using a conductive adhesive or epoxy or solder.
- 25 9. The waveguide to microstrip T-junction recited in claim 1, wherein the ridge further comprises steps in the height of the ridge.
10. The waveguide to microstrip T-junction recited in claim 1, wherein the ridge further comprises steps in the width of the ridge.
11. The waveguide to microstrip T-junction recited in claim 1, wherein the ridge includes a smoothly tapered width.
- 30 12. The waveguide to microstrip T-junction recited in claim 1, wherein the ridge includes a smoothly tapered height.

13. The waveguide to microstrip T-junction recited in claim 1, further comprising quarter wavelength matching sections in the microstrip transmission line.

14. The waveguide to microstrip T-junction recited in claim 1, further comprising an open circuited stub, and a quarter wavelength matching section in the microstrip transmission line.

5 15. The waveguide to microstrip T-junction recited in claim 1, further comprising a short circuited stub using a via, and a quarter wavelength matching section in the microstrip transmission line.

10 16. A waveguide to microstrip T-junction comprising:

a microstrip transmission line structure having a ground plane separated from a strip conductor by a dielectric layer;

a waveguide channel having a conductive periphery being electrically coupled to the ground plane to provide a waveguide short circuit wall located at the end of the waveguide channel;

a single finite length, rectangular cross-sectional conducting ridge inside the waveguide channel, such that the ridge is electrically coupled to the waveguide periphery, the end of the ridge is electrically coupled with the ground plane at the end of the waveguide channel, and the ridge provides a gap between itself and the waveguide periphery; and

20 an aperture in the ground plane section circumscribed by the waveguide periphery and ridge coupling with the ground plane.

17. The waveguide to microstrip T-junction recited in claim 16, wherein a longitudinal axis of the waveguide channel is perpendicular to the ground plane.

18. The waveguide to microstrip T-junction recited in claim 16, wherein a projection of the gap between the ridge and the waveguide periphery on the ground plane, is transverse to the microstrip transmission line;

25 19. The waveguide to microstrip T-junction recited in claim 16, wherein a long dimension of the aperture is transverse to the microstrip line.

20. The waveguide to microstrip T-junction recited in claim 16, wherein the aperture a C-shape.

30 21. The waveguide to microstrip T-junction recited in claim 16, wherein the waveguide channel has a rectangular cross-section.

22. The waveguide to microstrip T-junction recited in claim 16, wherein the waveguide channel has an elliptical/circular cross-section.

23. The waveguide to microstrip T-junction recited in claim 16, wherein the waveguide channel has a semicircular cross-section.

5 24. The waveguide to microstrip T-junction recited in claim 16, wherein the ground plane is bonded to the waveguide using a conductive adhesive or epoxy or solder.